CLAIMS

What is claimed is:

1. A method of setting an atrioventricular delay between an atrial event and stimulation of a ventricle, the method comprising:

providing stimulation pulses to the ventricle at a plurality of different atrioventricular delays after respective atrial events;

acquiring electrical heart activity data resulting from the applied stimulation pulses;

processing the electrical heart activity data to determine an atrioventricular delay that results in a fusion beat; and

setting an atrioventricular delay value to a particular value based on the atrioventricular delay so as to achieve fusion.

2. The method of claim 1, wherein processing the electrical heart activity comprises comparing at least one parameter from each set of data to determine which of the sets displays the strongest degree of fusion.

3. The method of claim 2, wherein processing the electrical heart activity comprises calculating an integral of an evoked response from each set of data.

4. The method of claim 2, wherein processing the electrical heart activity comprises calculating a peak amplitude of an evoked response from each set of data.

5. The method of claim 4, further comprising defining at least one threshold value, and comparing the respective peak amplitudes with the threshold.

6. The method of claim 1, wherein processing the electrical heart activity comprises comparing each set of data with a stored set of fusion data to determine which of the sets displays the strongest degree of fusion.

7. The method of claim 1, wherein acquiring the electrical heart activity comprises acquiring a signal corresponding to an evoked response for each stimulation pulse provided.

8. The method of claim 1, wherein processing the electrical heart activity comprises comparing a parameter of each set of data with a threshold value.

9. The method of claim 8, wherein comparing a parameter comprises comparing a peak amplitude for each set of data.

10. The method of claim 9, wherein comparing a peak amplitude comprises comparing each peak amplitude with an upper and lower threshold value, and wherein setting the atrioventricular delay value comprises setting the atrioventricular delay value to a value that falls between the respective threshold values.

11. The method of claim 1, wherein providing the stimulation pulses comprises providing the stimulation pulses at each of a plurality of atrioventricular delays after intrinsic atrial depolarizations.

12. The method of claim 1, wherein providing the stimulation pulses comprises providing the stimulation pulses at each of a plurality of atrioventricular delays after paced atrial depolarizations.

13. The method of claim 1, wherein setting the atrioventricular delay value comprises setting the atrioventricular delay value to the delay that resulted in a fusion beat.

14. The method of claim 1, wherein setting the atrioventricular delay value comprises setting the atrioventricular delay value to a value that is a predetermined amount shorter than the delay that resulted in a fusion beat.

15. The method of claim 14, wherein the atrioventricular delay value is between about 10 and about 50 milliseconds shorter than the atrioventricular delay that resulted in a fusion beat.

16. A method of setting an atrioventricular delay between an atrial event and stimulation of a ventricle, the method comprising:

adjusting the atrioventricular delay until an evoked response from the ventricle indicates a fusion beat; and

setting the atrioventricular delay to a value based on the atrioventricular delay that results in the fusion beat so as to achieve fusion.

17. The method of claim 16, further comprising comparing at least one parameter from each evoked response to determine which of the evoked responses displays the strongest degree of fusion.

18. The method of claim 17, wherein comparing at least one parameter comprises calculating an integral of each evoked response.

19. The method of claim 17, wherein comparing at least one parameter comprises calculating a peak amplitude of each evoked response.

20. The method of claim 16, further comprising defining at least one threshold value, and comparing a parameter value of each evoked response with the threshold value.

21. The method of claim 16, further comprising comparing each evoked response with a stored set of fusion data to determine which of the sets displays the strongest degree of fusion.

22. The method of claim 16, wherein setting the atrioventricular delay value comprises setting the atrioventricular delay value to the delay that resulted in a fusion beat.

23. The method of claim 16, wherein setting the atrioventricular delay value comprises setting the atrioventricular delay value to a value that is a predetermined amount shorter than the delay that resulted in a fusion beat.

24. The method of claim 23, wherein the atrioventricular delay value is between about 10 and about 50 milliseconds shorter than the atrioventricular delay that resulted in a fusion beat.

25. A system for setting an atrioventricular delay between an atrial event and stimulation of a ventricle, the system comprising:

a stimulation generator that is operative to generate stimulation pulses to be delivered to the ventricle;

circuitry in communication with the stimulation generator, the circuitry being operative to control the stimulation generator to produce stimulation pulses at a plurality of different atrioventricular delays after respective atrial events;

a sensor that is operative to acquire electrical heart activity data resulting from the applied stimulation pulses;

wherein the circuitry is in communication with the sensor and is operative to process the electrical heart activity data to determine an atrioventricular delay that results in a fusion beat, and wherein the circuitry is operative to set the atrioventricular delay value to a value based on the atrioventricular delay that results in the fusion beat so as to achieve fusion.

26. The system of claim 25 wherein the circuitry is operative to set the atrioventricular delay to the value of the delay that results in the fusion beat.

27. The system of claim 25 wherein the circuitry is operative to set the atrioventricular delay to a value that is a predetermined amount below the value of the delay that results in the fusion beat.

28. The system of claim 25 wherein the circuitry comprises a programmed controller.29. The system of claim 25 wherein the circuitry is operative to calculate at least one of an integral value, peak amplitude value, and maximum slope for the data collected at each atrioventricular delay.

30. A method of setting at least one of an AV delay and a PV delay in an implantable stimulation device, wherein the method comprises:

acquiring evoked response data for a plurality of delays for at least one of AV delays and PV delays;

comparing the data and determining a given one of the delays whose data displays the most evidence of fusion; and

setting a current delay to the delay that displayed the most evidence of fusion.

31. The method according to claim 30, further comprising storing data relating to the delay that displayed the most evidence of fusion.

32. The method according to claim 30, wherein comparing the data comprises comparing integral values of evoked responses with one another and determining the delay displaying the most evidence of fusion by finding a smallest one of the integral values.

33. A method of biventricular pacing comprising:

providing stimulation pulses to a right ventricle at a plurality of different atrioventricular delays after respective sensed events in the right atrium;

providing stimulation pulses to a left ventricle at a plurality of different atrioventricular delays after respective sensed events in the left atrium;

acquiring electrical heart activity data resulting from the applied stimulation pulses;

processing the electrical heart activity data to determine atrioventricular delays that result in fusion beats in the right and left ventricles; and

setting a left atrioventricular delay value and a right atrioventricular delay value to particular values based on the respective atrioventricular delays so as to achieve fusion in the left and right ventricles.

34. The method of claim 33, wherein processing the electrical heart activity comprises comparing at least one parameter from each set of data to determine which set displays the strongest degree of fusion in the left ventricle and the right ventricle.

35. The method of claim 34, wherein processing the electrical heart activity comprises calculating an integral of an evoked response from each set of data.

36. The method of claim 34, wherein processing the electrical heart activity comprises calculating a peak amplitude of an evoked response from each set of data.

37. The method of claim 34, further comprising defining at least one threshold value, and comparing the respective peak amplitudes with the threshold.

38. The method of claim 34, wherein processing the electrical heart activity comprises comparing each set of data with a stored set of fusion data to determine which of the sets displays the strongest degree of fusion for the right ventricle and for the left ventricle.

39. The method of claim 34, wherein comparing a parameter comprises comparing a peak amplitude for each set of data.

40. The method of claim 33, wherein setting the atrioventricular delay values comprises setting the atrioventricular delay values to the delays that resulted in fusion beats in the right and left ventricles.

41. The method of claim 33, wherein setting the atrioventricular delay values comprises setting the atrioventricular delay values to respective values that are a predetermined amount shorter than the delays that resulted in fusion beats in the right and left ventricles.

42. The method of claim 41, wherein the atrioventricular delay values are between about 10 and about 50 milliseconds shorter than the atrioventricular delays that resulted in fusion beats in the right and left ventricles.